

**JULIO L. BETANCOURT**

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**EDUCATION**

Ph.D. Geosciences, minor in Ecology & Evolutionary Biology, U. of Arizona, Dec. 1989  
 M.S. Geosciences, minor in Ecology & Evolutionary Biology, U. of Arizona, May 1983  
 B.A. Anthropology, minor in Geography, University of Texas, Austin, May 1975

**PROFESSIONAL EXPERIENCE**

*2013-Present:* Lead Scientist, Branch of Regional Research, Water Mission Area, Branch of Regional Research, Eastern Region, USGS  
*1989-2013:* Project Chief, Branch of Regional Research, Water Mission Area, Branch of Regional Research, Western Region, USGS  
*1989-Present:* Adjunct Professor, Dept. of Geosciences, U. of Arizona.  
*2001-Present:* Adjunct Professor, Dept. of Geography, U. of Arizona  
*2007-Present:* Adjunct Professor, Laboratory of Tree-Ring Research  
*2008-Present:* Adjunct Professor, Office of Arid Lands Studies  
*2008-Present:* Adjunct Professor, School of Natural Resources  
*1992-1998:* Research Advisor (1992-1998), Ecology Discipline, National Research Program, Water Resources Division, USGS. Duties included summarizing and promoting ecological research within the agency, chairing peer review panels, and making recommendations for individual project funds. At the time, the Ecology group spanned 21 projects ranging from plankton dynamics in tidal estuaries to microbial geochemical modeling, an overall staff of about 100 scientists and support personnel, and average appropriated funding level of ca. \$4-5 million/yr.  
*2007-Present:* Co-Founder & Co-Chair, Board of Directors, USA-National Phenology Network  
*2008-Present:* Co-Founder & Federal Liaison, Southern Arizona Buffelgrass Coordination Center

**HONORS AND AWARDS**

2015 Southwest Books of the Year, Best Reading List, Pima County Public Library (Requiem)  
 2014 2014 Finalist New Mexico-Arizona Book Awards (Requiem)  
 2012 *Farouk El-Baz Award for Desert Research*, Geological Society of America (\$10K Prize)  
 2011 *U.S. Department of Interior Secretary's (DOI) Partners in Conservation Award* [shared with non-profit (SABCC) I helped start and its partners]  
 2009 *Fellow of the American Geophysical Union*, Elected  
 2008 *Presidential Rank Service Award for Meritorious Executive* 2008 (2<sup>nd</sup> highest award for federal employees in the Senior Executive Service, awarded by the White House):  
<http://www.usgs.gov/newsroom/article.asp?ID=2094>  
 2005 *William R. Boggess Award*, American Water Resources Association (with Steve Gray and Steve Jackson)

- 2002 U.S. Department of Interior, *Meritorious Service Award* 2002 (2<sup>nd</sup> highest award in DOI)
- 2001 *William Skinner Cooper Award*, Ecological Society of America, August 2001 (with Tom Swetnam) [www.esa.org/history/Awards/bulletin/cooper2001.pdf](http://www.esa.org/history/Awards/bulletin/cooper2001.pdf)
- 1994 U.S. Department of Interior, *Superior Service Award* 1994 (third highest award in DOI)
- 1994 Fulbright Scholar, Argentina

#### MEMBERSHIPS IN PROFESSIONAL SOCIETIES

International Biogeography Society (founding member)  
 American Geophysical Union (elected a Fellow in 2009)  
 Geological Society of America  
 American Association for the Advancement of Science

#### PROFESSIONAL AND ACADEMIC SERVICE

- AGU Macelwane Medal Selection Committee 2015
- NEON Federal Agency Working Group 2015
- AGU, led 3 Fellows nominations 2015
- GSA Farouk El-Baz Award Selection Committee 2015
- Advisory Group, USGS Innovation Center for Earth Sciences 2014-2015
- Review Panel, DOI National Climate Change & Wildlife Science Center 2014
- USGS ST Research Grade Evaluation Panel, February 2014
- AGU, Led 1 Nomination, support letters for 3 nominations 2014
- Phenology Indicators Technical Team (PITT), National Climate Assessment Development and Advisory Committee (NCADAC), 2013-2014
- USGS 2<sup>nd</sup> Level Interdisciplinary Research Grade Evaluation Panel, June 2012
- Expert Reviewer, Southwest Climate Assessment Technical Report, National Climate Assessment, February 2012
- USGS-Biology Research Grade Evaluation Panel, Austin Texas, August 11, 2011
- National Center for Ecological Analysis and Synthesis (NCEAS) Working Group on "Forecasting phenology: Integrating ecology, climatology, and phylogeny to understand plant responses to climate change"
- USGS Representative, Technical Users Group, Eastern Forest and Western Wildland Environmental Threat Assessment Centers, U.S. Forest Service, 2011
- Senior Scientist (ST) Review Panel for USGS nominations, Presidential Early Career Awards for Scientists and Engineers, November 2010
- Reviewer, USGS Ecosystem Science Strategy Report, Sept. 2010
- Search Committee, Assistant Professor in Phenoclimatology, Univ. of Az; I wrote and executed the Cooperative Agreement between USGS and the University of Arizona that funds this new position
- Selection Committee, AGU Biogeosciences Section Travel Awards, Fall 2010
- Advisor to the Subcommittee on National Parks, Forests and Public Lands, U.S. House of Representatives, April 9, 2010 Congressional Field Hearings on Buffelgrass Invasion.
- Author Nomination Panel, US Global Change Research Program & Office of Science & Technology: I was one of about 20 scientists that recruited and vetted U.S. nominations for Coordinating Lead Authors, Lead Authors, Review Editors, contributing authors and expert reviewers from the U.S. for the Fifth Assessment Report (AR5), Working Group I, Intergovernmental Panel on Climate Change

- Reviewer, USGS Climate Change Science Strategy Report, Sept. 2010
- Search Committee for the Executive Director of the Southern Arizona Buffelgrass Coordination Center, 2009-2010
- Member of Selection Committee, William McGinnies Graduate Fellowship, Univ of AZ, 2005-present: I was the first recipient of this award in 1985, and was followed by an impressive list of winners with successful careers, including some of my own students <http://snre.arizona.edu/mcginnies>
- Selection Committee, Institute of Environment Graduate Student Travel Awards, Univ. of Az; this entailed reviewing 57 applications across the U. of AZ proposing to give talks and posters and allocating \$14K (<http://www.environment.arizona.edu/news/travel-award-winners-fall-2010>)
- Awards Committee, International Biogeography Society 2006-now
- Awards Subcommittee, William S. Cooper Award, Ecological Society of America, 2008, 2009
- Advisory Committee, Starr Pass Environmental Enhancement Fund 2005-2008
- Editorial Board, *Diversity and Distributions*
- Coordinator, NSF-Earth System History and InterAmerican Institute initiative for discounted Accelerator Mass Spectrometer <sup>14</sup>C dates for Latin American Quaternary scientists.
- Search Committee, Assistant Professor Search, Laboratory of Tree-Ring Research, University of Arizona, 1999-2000
- Science Advisory Committee, Arizona District, WRD, USGS, 1998-1999
- Advisory Committee, Institute for the Study of Planet Earth, University of Arizona, 2000-present
- Advisory Committee, University of Arizona Press, 1997-1999
- Search Committee, Geomorphologist Search, Dept. Geosciences, University of Arizona, 1998-1999
- NSF Geology and Paleontology, Earth System History, Hydrology, Geography and Ecology Programs, Proposal Reviews
- National Geographic Society, proposal reviews
- NSF, PAGES, Pole-Equator-Pole Paleoclimate Program, Steering Committee Member, 1996-1997
- USGS, Mapping Division: Consultation on starting Research Program like NRP in Mapping Division (Nov. 1998).
- NSF Earth System History (ESH) Panel Member, 1995, 1996, 1997
- USGS Global Change Program, Science Advisory Panel, 1995, 1996
- University of Arizona Global Change Committee, 1995-present
- USGS NAWQA Trends Committee, 1994
- USGS BioTask Group, 1993-1994
- Search Committee, Systems Ecology Position, University of Arizona, 1994
- USGS, Technical Advisory Group, Nuclear Hydrology Program, Nevada Nuclear Waste Storage Investigations 1993

#### EXTRAMURAL FUNDS

##### Funded Projects Listed Only Since 2000

- DOI Southwest Climate Science Center, 2013-2014: Influence of interannual North Pacific influence on Sierra Nevada Fire Regimes., w/ Valerie Trouet, UArizona (\$139K, funded)

- FEMA, 2011-2012w/ Jeff Guthrie, Pima County Office of Emergency Management & Homeland Security and Lindy Brigham, Southern Arizona Buffelgrass Coordination Center, *Pima County Wildfire Risk Mitigation Project* (**\$3.4M**)
- NSF-Macrosystems in Biology, 2011-2016, Collaborator w/ Russ Monson (University of Arizona) and others *Processes and Patterns in The North American Monsoon Macrosystem* (**\$2.95M**)
- National Geographic Society, 2010-2012, *An Ice Age Refugium for Plant Community Assembly in the Sonoran Desert* (**\$32K**), w/ Camille Holmgren
- National Park Service/USGS Park Oriented Biological Support (POBS) Program, 2010-2012, w/ Jennifer Pierce (Boise State University), *Vegetation and Fire History of City of Rocks (CIRO) National Reserve: Relevance for Understanding the Role of Climate and Disturbance in Plant Migration in the American West*, (**\$60.4K**)
- U.S. Geologic Survey and University of Arizona, Cooperative Agreement, w/Lisa Graumlich (U. of Arizona), *Costshare of a tenure-track faculty line in Phenoclimatology to support research activities related to the USA-National Phenology Network*, (**\$900K**)
- National Geographic Society, 2009-2010, with Jeff Pigati (USGS), Jason Rech (Miami U-Ohio), and Claudio Latorre (Pontifica Universidad Catolica de Chile), *Evidence of an extraterrestrial impact or the result of natural processes? Physical and chemical analysis of Late Pleistocene wetland deposits in the Americas* (**\$24.5K**)
- NSF-Directorate for Biological Sciences, 2007-2012, *Research Coordination Network-USA National Phenology Network*, Steering Committee w/Mark Schwartz (UW-Milwaukee) and others (**\$500K**)
- USDA-Economic Research Service-PRISM, 2006-2007, w/George Frisvold, Barron Orr, and Stuart Marsh (U. of Arizona), *A decision model for controlling buffelgrass (Pennisetum ciliare) invasion in an urban-wildland interface combining dynamic programming with the analytical hierarchy process* (**\$119K**)
- Kinder Morgan, Inc, 2005-2009, w/Travis Bean (U. of Arizona), *Buffelgrass mitigation in Pima County: Outreach and demonstration project* (**\$175K**)
- National Park Service, Joshua Tree National Park Competitive Science Grant, 2005-2006, w/Camille Holmgren (Cal State-Long Beach), *A Long Term Vegetation History of the Mojave/Colorado Desert Ecotone at Joshua Tree National Monument* (**\$12K**)
- NSF-Division of Environmental Biology, 2006, w/Mark Schwartz (UW-Milwaukee), *2nd National Phenology Network (NPN) Planning Workshop, Milwaukee* (**\$26K**)
- NASA, USGS, and U.S. Fish & Wildlife Service, 2005, *Matching funds from federal agencies for 2<sup>nd</sup> National Phenology Network (NPN) Planning Workshop, Milwaukee* (**\$15K**)
- NSF-Division of Biological Infrastructure, 2005, *1<sup>st</sup> National Phenology Network (NPN) Planning Workshop, Tucson* (**\$25K**)
- EPA, USDA-Forest Service, USGS, National Park Service 2005, w/Mark Schwartz (UW-Milwaukee), *Matching Funds from Federal Agencies for 1<sup>st</sup> National Phenology Network (NPN) Planning Workshop, Tucson* (**\$20K**)
- National Park Service, Desert Southwest Cooperative Ecosystem Studies Unit, 2004-2006, *Vegetation history along the western margin of the Sonoran Desert, SE California, U.S. and N. Baja California, Mexico* (**\$10K**)
- NSF-Division of Earth Sciences, 2002-2004, w/ Jay Quade (U. of Arizona) and Mathias Vuille (U. Massachussetts), *Past and modern variability of summer and winter rainfall on the Pacific slope of the central Andes* (**\$178K**)

- Navajo Nation, 2002-2003, w/ Jay Quade and Jon Patchett (U. of Arizona), *Use of radiogenic isotopes to determine provenance of archeological materials and to study influence of atmospheric dust on soil formation and fertility* (\$28K)
- NSF-Division of Earth Sciences, 1999-2001, w/ Jay Quade (Univ. of Arizona), *Paleoenvironmental change in the Atacama Desert during late Quaternary: Evidence from middens and paleosprings* (\$258K)
- National Park Service, 2000 to 2000, w/Jay Quade and Jeff Dean (Univ. of Arizona), *Use of <sup>87</sup>Sr/<sup>86</sup>Sr to source architectural timber at Chaco Canyon National Cultural Historical Park, New Mexico* (\$20K)
- NSF-Earth System History Program and InterAmerican Institute, 2001, w/Jay Quade, *Workshop on Central Andes Paleoclimatology*, Tucson, AZ (\$30K)
- NSF-Division of Environmental Biology, 1998-2001, w/Steve Jackson (U. of Wyoming), *Late Holocene expansion of Utah juniper in Wyoming: A model system for studying the ecology of natural invasions* (\$350K)

#### MEETINGS, WORKSHOPS & SESSIONS ORGANIZED

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| 12/18/14     | Co-Chair Session GC51G "Key Challenges in Climate Adaptation: Communication, Data-Intensive Approaches to Interdisciplinary Collaboration, and Long-Range Forecasting of Seasonal Transitions, AGU Fall Meeting 2014   |
| 05/12        | Organizing Committee, USA-National Phenology Network, Research Coordination Network 3rd Annual Meeting, May 2012   |
| 12/14/10     | Co-Chair Session B03: Phenologies, Change and Sustainability I, AGU Fall Meeting, 2010   |
| 03/7-9/10    | Organizing Committee, 4 <sup>th</sup> Collaborative Adaptive Management Network (CAMNet) Conference, "Adaptive Management and Climate Change," Tucson, AZ, sponsored by BLM, the Nature Conservancy and the Udall Foundations' Institute for Environmental Conflict Resolution   |
| 12/15/10     | Organizing Committee, Session B08: Toward Phenological Assessments: Regional, National, Global, AGU Fall Meeting, Dec. 12-17, 2010.<br><a href="http://www.agu.org/meetings/fm09/program/scientific_session_search.php?show=detail&amp;sessid=186">http://www.agu.org/meetings/fm09/program/scientific_session_search.php?show=detail&amp;sessid=186</a> |
| 10/5-9/09    | Co-Organizer (with Geoff Henebry, Mark Schwartz and others), Third Annual NSF-Research Coordination Network for phenological science and monitoring in the U.S., Milwaukee, WI. Theme: <i>Towards the First National Phenological Assessment</i>   |
| 09/15-19/08  | Co-Organizer (with Mark Schwartz and others), Second Annual NSF-Research Coordination Network for phenological science and monitoring in the U.S., Milwaukee, WI   |
| 08/27-30/07: | Co-Organizer (with Mark Schwartz and others), First Annual NSF-Research Coordination Network for phenological science and monitoring in the U.S., Milwaukee, WI.   |
| 10/10-12/06  | Co-Organizer (with Mark Schwartz and others), USA-National Phenology Network 2 <sup>nd</sup> Implementation Workshop, Milwaukee, WI  |
| 08/26-28/05  | Co-Organizer and Convener (with Mark Schwartz and others), USA-National Phenology Network Implementation Workshop, Tucson, AZ  |
| 08/24-26/04  | Co-Organizer and Convener (with Dave Breshears, Univ. of Arizona and Pat Mulholland, Oak Ridge National Laboratories), NEON's Role in Addressing the   |

- Ecological Impacts of Climate Change, AIBS and NSF, Tucson, AZ  
<http://www.neoninc.org/sites/default/files/neon-climate-report.pdf>
- 01/11-16/01 Co-Organizer (with Jay Quade, Univ. of Arizona), Paleoclimatology of the Central Andes, University of Arizona, Tucson  
<http://www.paztcn.wr.usgs.gov/pkaw/index.html>
- 03/10-13/91 Organizer and Convener, 8<sup>th</sup> Annual Pacific Climate (PACCLIM) Workshop, Asilomar, CA
- 04/90 Organizer and Convener, 7<sup>th</sup> Annual Pacific Climate (PACCLIM) Workshop, Asilomar, CA
- 05/05/89 Organizer and Convener, 6th Annual Pacific Climate (PACCLIM) Workshop, Asilomar, CA

#### TECHNICAL TRAINING

- USDA, Forest Service Training Center, Ecosystem Management-Regions 2 and 3, Climate Variability and Ecosystem Management (3 hrs), Phoenix.
- Short Course, Methods in Quaternary Paleoecology, Universidad de La Serena, Chile October 2007
- Short Course, Global Change in the Americas, Universidad de Andalucia, Spain, Sept. 1996
- Environmental history of the Southwest (GEOS 220), Univ. of Arizona, Fall-Spring 1999-2000, this is a General Education/Natural Science (Tier 2: Sophomore level) class that I developed with my long-term colleagues Tom Swetnam and Jeff Dean. The class now has an enrollment of ~125 students and is taught by Paul Sheppard (<http://www.ltrr.arizona.edu/geos220/>).

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#### STUDENTS AND POSTDOCS ADVISED

##### Postdocs

Steve Gray, NRC Postdoctoral Fellow 2004-2006 (USGS)

Sean Connin, Ike Russell Postdoctoral Fellowship 1996-1997 (Desert Laboratory, Univ. Arizona, co-advised w/ Jay Quade)

Quinfeng Guo, Ike Russell Postdoctoral Fellowship 2000-2002 (Desert Laboratory, Univ. Arizona)

##### Graduate Students (only those I advised or co-advised; I've served on graduate committees and published papers with many other students)

- Alison Macalady, Ph.D. 2014, Univ. of Arizona, "Relationship of tree growth and physiology to pinyon pine mortality in the Southwest"
- Kerrie Weppner, M.S. 2012, Boise State University, "A Holocene history of fire and the alluvial response at City of Rocks National Reserve, south-central Idaho." (co-advised w/ Jen Pierce)
- Aaryn Olsson, Ph.D. 2010, Univ. of Arizona, "Ecosystem transformation by buffelgrass: climatology of invasion, effects on Arizona Upland diversity, and remote sensing tools for managers" (co-advised with Stuart Marsh)
- Amanda Reynolds, Ph.D. 2008, Univ. of Arizona, "Hydrological, ecological and archeological use of radiogenic isotopes as tracers" (co-advised with Jay Quade)

- Camille Holmgren, M.S., 2000, Univ. of Arizona, "Holocene vegetation history of the Arequipa region, southern Peru;"
- Camille Holmgren, Ph.D., 2005, Univ. of Arizona, "Vegetation history of the U.S./Mexico Borderland,"
- Tamara Wilson, M.S., 2002, Univ. of Arizona "Precipitation regionalization and synoptic climatology of Baja California," M.S. (co-advised w/ Andrew Comrie)
- Jodi Norris, Ph.D., 2007 (Univ. of Wyoming), "Bioclimatology and migrational history of ponderosa pine in the central Rockies" (co-advised w/ Steve Jackson)
- Steve Gray, Ph.D., 2003 (Univ. of Wyoming), "Tree-ring assessment of climate and streamflow variability in the central Rockies" (co-advised w/ Steve Jackson)
- Claudio Latorre, Ph.D., 2002 (Univ. of Chile), "Vegetation and climate history of the Calama/Atacama Basins, northern Chile." (co-advised w/ Carolina Villagran)
- Jason Rech, Ph.D. 2001 (Univ. Arizona), "Paleohydrology of the central Atacama Desert, northern Chile" (co-advised w/Jay Quade)
- Mark Lyford, Ph.D., 2001 (Univ. of Wyoming), "Migrational history of Utah juniper (*Juniperus osteosperma*) east of the Continental Divide" (co-advised w/ Steve Jackson)
- Angela Barclay, M.S., 2000, (Univ. Arizona), "Effects of ryegrass reseeding on native plant species in burned ponderosa pine forests"
- Crista Plazcek, M.S., 2000, (Univ. of Arizona), "Holocene lake history of Laguna Aricota, southern Peru." (co-advised w/ Jay Quade)
- Peter Van de Water, Ph.D. 1999 (Univ. Arizona), " $\delta^{13}\text{C}$  and stomatal density variability in modern and fossil leaves of key plants in the western United States"; M.S. 1993 (Univ. Arizona), "Ecophysiological response of *Pinus flexilis* to atmospheric  $\text{CO}_2$  enrichment during deglaciation" (co-advised w/ S.W. Leavitt)
- Elise Pendall, Ph.D. 1997 (Univ. Arizona), "Precipitation seasonality recorded in D/H ratios of pinyon pine cellulose in the southwestern United States" (co-advised with S.W. Leavitt)
- Lisa Pedicino, M.S. 1997 (Univ. Arizona), "Carbon isotopic variations in 7 southwestern U.S. plants from herbarium collections of the last 150 years" (co-advised with S.W. Leavitt)
- Kim Hunter, Ph.D. 1996 (Univ. Nevada-Las Vegas), "A molecular phylogenetic analysis of the *Larrea* complex" (co-advised with Brett Riddle)

### Undergraduate Students

I usually employ and mentor 2-3 undergraduate students a year from the University of Arizona's Departments of Geosciences, Ecology & Evolutionary Biology, Plant Sciences, and Renewable Resources (since 1995: Angela Rickaway, Mike Wall, Leslie Parkinson, Mika Jenzen, Shawn Byron, Beth Barton, Beth Duschatko, Bobby Gillis, Elena Henry, Tim Fischer, Erin Gleeson, Ben Wilder Nadine Warneke, and Leandra Romero). I have also taken on undergraduate apprentices during the summer from other universities (Richard Barclay, Western Washington University, 1995). Because I came up through the USGS Minority Participation in the Earth Sciences Program, I have taken special interest in mentoring MPES students through at least two of their undergraduate years (Carlos Mendoza, Gabriel Cisneros).

### **PUBLICATIONS**

**(2 books and ~160 journal articles, book chapters, proceeding papers and monographs)**



- Milly, P.C., Betancourt, J.L., Falkenmark, M., Hirsch, R.M., Kundzewicz, Z.W., Lettenmaier, D.P., Stouffer, R., Krysanova, V. 2015. Commentary on Critiques of “Stationarity is Dead: Whither Water Management?” *Water Resources Research*, (In Review).
- Ault, T.A., Schwartz, M.D., Zurita-Milla, R., Weltzin, J.F., Betancourt, J.L., 2015, Trends and natural variability in North American spring onset in a new gridded dataset of spring indices. *Journal of Climate* (In press).
- Jackson, W.A., Bohlke, J.K., Andraski, B.J. Fahlquist, L., Laura Bexfield, L. Eckardt, F.D., John B. Gates, J.B., Davila, A., McKay, C.P., Rao, B., Sevanthi, R., Rajagopalan, S., Estrada, N., Sturchio, N., Hatzinger, P.B., Anderson, T.A., Orris, G., Julio Betancourt, J.L., Stonestrom, D., Latorre, C., Li, Y., Harvey, G., 2015, Global survey of perchlorate and nitrate co-occurrence in arid and semi-arid regions. *Geochimica et Cosmochimica Acta* (In press).
- Norris, J., Betancourt, J.L., and Jackson, S.T., 2015, Late Holocene expansion of ponderosa pine in the central Rockies. *Journal of Biogeography* (In Review)
- Strong, C., Zuckerberg, B., Betancourt, J.L., and Koenig, W., 2015, Climatic dipoles drive two principal modes of North American boreal bird irruption. *Proceedings of the National Academy of Sciences* (<http://www.pnas.org/cgi/doi/10.1073/pnas.1418414112>).
- McCabe, G.J., Betancourt, J.L., and Feng, S., 2015, Variability in the start, end, and length of frost-free periods across the conterminous united states during the past century. *International Journal of Climatology* DOI: 10.1002/joc.4315.
- Grimstead, D.N., Hudson, A.M., Reynolds, A.C., Betancourt, J.L., Akin, N.J. 2014. Using strontium isotope population variance in turkey remains to evaluate domestication: A case from Chaco Canyon, New Mexico. *Journal of Archaeological Method and Theory* DOI: 10.1007/s10816-014-9228-5.
- Holmgren, C., Betancourt, J.L., Peñalba, C., Delgadillo, J., Hunter, K.L., Zuravnsky, Rylander, K.A., Weiss, J., 2014. Evidence against a Sonoran Desert Pleistocene refugium in the Lower Colorado River Basin/Gulf of California. *Journal of Biogeography* doi:10.1111/jbi.12337.
- Webb, R.H., Betancourt, J.L., Turner, R.M., and Johnson, R.R. 2014. *Requiem for the Santa Cruz: An environmental history of an Arizona River*. University of Arizona Press, Tucson, 296 p.
- Wilder, B.T., Betancourt, J.L., Epps, C.W., Crowhurst, R.S., Mead, J.I., and Ezcurra, E. 2014. Local extinction and unintentional rewilding of bighorn sheep (*Ovis canadensis*) on a desert island. *PLOS ONE*, DOI: 10.1371/journal.pone.0091358
- McCabe, G.J., Betancourt, J.L., Pederson, G.T., and Schwartz, M.D. 2013. Variability common to first leaf dates and snowpack in the western conterminous United States. *Earth Interactions* **17**, 1–18.
- Davies, T.J., Wolkovich, E.M., Kraft, N.J.B., Salamin N., Allen, J.M., Ault, T.R., Betancourt, J.L., Bolmgren, K., Cleland, E.E., Cook B.I., Crimmins, T.M., Mazer, S.J., McCabe, G.J., McGill, B.J., Parmesan, C., Pau, S., Regetz, J., Schwartz, M.D., and Travers, S. 2013. Strong evidence for evolutionary inertia in plant phenological responses. *Journal of Ecology* DOI: 10.1111/1365-2745.12154..
- Powell, S.L., Hansen, A.J., Rodhouse, T.J., Garrett, Betancourt, J.L., L.K., Dicus, G.H., Lonaker, M.K. 2013. Woodland dynamics at the northern range periphery: A challenge for protected area managers. *PLOS ONE* 8(5) E70454.
- Weppner, K.N., Pierce, J.L., and Betancourt, J.L. 2013. Holocene fire occurrence and alluvial responses at the leading edge of pinyon-juniper migration in the northern Great Basin, USA. *Quaternary Research* <http://dx.doi.org/10.1016/j.yqres.2013.06.004>
- Ault, T.R., Henbry, G.M., de Beurs, K.M., Schwartz, M.D., Betancourt, J.L., and Moore, D. 2013. Lessons from the false spring of 2012, earliest on record in North America. *EOS, Transactions of the American Geophysical Union* 94, 181-182, DOI: 10.1002/2013EO200001



- Pederson, G., Betancourt, J.L., McCabe, G.J. 2013. Regional patterns and proximal causes of the recent snowpack decline in the Rocky Mountains, USA. *Geophysical Research Letters* DOI: 10.1002/grl.50424.
- Pierson, E.A., Turner, R.M., and Betancourt, J.L. 2013. Regional demographic trends from long-term studies of saguaro (*Carnegiea gigantea*) across the northern Sonoran Desert. *Journal of Arid Environments* 88, 57-69.
- Frid, L., Holcombe, T., Morisette, J.T., Olsson, A.D., Brigham, L., Bean, T., Betancourt, J.L., and Bryan, K. 2013. Using state and transition modeling to account for imperfect knowledge in invasive species management. *Invasive Plant Science and Management* 6(1):36-47; DOI: <http://dx.doi.org/10.1614/IPSM-D-11-00065.1>; URL: <http://dx.doi.org/10.1614/IPSM-D-11-00065.1>.
- Schwartz, M.D., Ault, T.R., Betancourt, J.L. 2012. Spring onset variations and trends in the continental USA: Past and regional assessment using temperature-based indices. *International Journal of Climatology* DOI: 10.1002/joc.3625.
- Belnap, J., Ludwig, J.A., Wilcox, B., Bestlemeyer, B., Betancourt, J.L., Dean, W.J.D., Milton, S.J. 2012. Introduced and invasive species in novel rangeland ecosystems: Friends or Foes? *Journal of Rangeland Ecology & Management* 65: 569-578, DOI: 10.2111/REM-D-11-00157.1.
- Weiss, J.L., Betancourt, J.L., Overpeck, J.T. 2012. Climatic limits on foliar phenology during major droughts in the southwestern U.S.A. *Journal of Geophysical Research-Biogeosciences* v.117, G03031, doi:10.1029/2012JG001993.
- Cook, B.I., Wolkovich, E.M., Davies, T.J., Ault, T.R., Allen, J., Betancourt, J.L., Bolmgren, Cleland, E.E., Crimmins, T.M., Kraft, N.J.B., Lancaster, L.T., Mazer, S.J., McGill, B.J., McCabe, G.J., Parmesan, C., Pau, S., Regetz, J., Salamin, N., Schwartz, M.D., Travers, S.E. 2012. Sensitivity of spring phenology to warming across temporal and spatial climate gradients in two independent databases. *Ecosystems* DOI: 10.1007/s10021-012-9584-5.
- Olsson, A., Betancourt, J.L., Marsh, S., Crimmins, M. 2012. Constancy of local spread rates for buffelgrass (*Pennisetum ciliare* L.) in the Arizona Upland of the Sonoran Desert. *Journal of Arid Environments* 87, 136-143.
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#### INVITED DEPARTMENTAL SEMINARS AT UNIVERSITIES

##### (82 invited departmental seminars)

- 2014 **11/07/14**: Invited departmental seminar, Department of Geology, University of Maryland
- 2013 **04/29/14**: Invited departmental seminar, Department of Geosciences, Princeton University  
**11/14/14**: Invited departmental seminars, Richard Henson School of Science, Salisbury University
- 2012 **03/14/12**: "To everything there is a season: Phenology in a changing World."  
 Department of Environmental Earth System Science, Stanford University  
**02/07/12**: "To everything there is a season: Phenology in a changing World." Global Change & Ecosystem Center, University of Utah
- 2011 **03/7/11**: "How do plant migrations actually happen? Lessons from past & recent invasions in the American West." Ecology & Evolutionary Biology Department, University of Arizona.  
**1/13/11**: "Climatology of spring onset variations and trends in western North America," Ecology Center, Utah State University, Logan
- 2010 **10/15/10**: Harold and Florence Mayer Lecture Speaker, "Vegetation Dynamics and Change in the Western U.S.," Department of Geography, University of WI-Milwaukee

- 10/13/10:** "Climatologies of spring onset variations and trends in the U.S.," School of Forestry, Northern Arizona University, Flagstaff
- 2009 **12/04/09:** Inaugural My Arizona Lecture, "Can We Save Arizona's Sonoran Desert?", School of Geography and Regional Development, University of Arizona, Tucson; this is an annual lecture recently established to introduce new faculty and students across the campus to the region (<http://uanews.org/node/28497>).
- 11/10/09:** Invited Departmental Seminar, "Update on Development of a USA-National Phenology Network," School of Natural Resources, University of Nebraska, Lincoln
- 11/11/09:** "How do Plants Actually Migrate: Lessons from the Holocene in the American West," School of Natural Resources, University of Nebraska, Lincoln
- 09/30/09:** "Climatic Precursors for Early Spring Onset and Large Wildfires in the Western U.S.," Invited Departmental Seminar, Department of Hydrology and Water Resources, University of Arizona
- 7/01/09:** "How do plants actually migrate? Lessons from the Holocene in the American West," Laboratory of Tree-Ring Research Summer Seminar, University of Arizona
- 4/15/09:** "Decisions, Decisions: Grass Invasions and Altered Wildfire Regimes in the American Deserts," World Issues Forum, Fairhaven College, Western Washington University, Bellingham
- 4/17/09:** "Climate Variability and Climate Change in the American West," Huxley College of the Environment, Western Washington University, Bellingham
- 1/28/09:** "Natural History of Plant Invasions & Altered Fire Regimes in the American Deserts" University of Arizona College of Law, Environment & Law Graduate Seminar
- 2008 **03/28/08:** "Climate Change, Nonstationarity, and the Problems they Pose for Resource Planning and Management in the West," 75<sup>th</sup> Anniversary of the Dept. of Geography and Regional Development, University of Arizona.
- 03/05/08:** "Policy Issues in Invasive Species Management," Sustainability Seminar, College of Law, University of Arizona
- 02/27/08:** "An Environmental History of the Atacama Desert," Quaternary Paleoecology Seminar Series, University of Minnesota
- 02/28/08** "Towards a USA-National Phenology Network," Department of Ecology, University of Minnesota
- 02/28/08:** "Patterns, Sources and Impacts of decadal-to-multidecadal climate variability," Penn State, Department of Geology, University of Minnesota.
- 02/13/08:** "Patterns, sources and impacts of decadal-to-multidecadal climate variability in the U.S." invited departmental seminar, UC-Merced School of Engineering
- 01/25/08:** "Methodology and Synthesis: The Fossil Rodent Midden Record in the Americas," University of Arizona, NSF IGERT program.
- 2007 **02/07:** "Environmental History of the Atacama Desert," Department of Earth & Planetary Sciences, University of New Mexico.
- 02/07:** "Towards a USA-National Phenology Network," Department of Biology, University of New Mexico.
- 2006 **06/06 :** "Development of a USA-National Phenology Network," University of Arizona
- 09/06:** "Environmental History of the Atacama Desert: Nature's Experiment at the Edge of Life," Distinguished Ecologist Lecture Series, Michigan Technological University.

- 09/06:** "Development of a USA-National Phenology Network," Michigan Technological University
- 04/06:** "Patterns, sources, and impacts of decadal-to-multidecadal climate variability in the U.S.," Ecology Seminar Series, College of Forestry, Oregon State University.
- 03/06:** "Patterns, sources, and impacts of decadal-to-multidecadal climate variability in the U.S., Dept. of Atmospheric Sciences Lecture Series, University of Arizona.
- 02/06:** "Patterns, sources, and impacts of decadal-to-multidecadal climate variability in the U.S., Ecology Seminar Series, University of Wyoming
- 02/06:** "Environmental History of the Atacama Desert: Nature's Experiment at the Edge of Life," Department of Ecology Seminar Series, Univ. of Wyoming
- 2003    **10/09/03:** "Advances in Arid Lands Paleoecology: The rodent midden record in the Americas," Department of Geography, University of Nevada, Reno
- 10/08/03:** "Historic and modern megadroughts, their causes and impacts, " University of Nevada, Reno, Ecology Evolution & Conservation Biology Program
- 09/26/03:** "PDO, AMO, and megadrought in the Western U.S.," Society for Earth Sciences Students, University of Arizona
- 09/26/03:** "PDO, AMO, and megadrought in the Western U.S.," Departmental Seminar, Laboratory of Tree-Ring Research, University of Arizona
- 01/03:** "Recent Advances and Prospectus for Arid Lands Paleoecology" Departmental Colloquium, Department of Geography, University of Arizona
- 2002    **11/02:** "Climatological and environmental circumstances for megadroughts across the western U.S." Department of Soil, Water and Environmental Sciences, University of Arizona
- 09/02:** "The fossil rodent midden record in the Americas: Synthesis and update" Departmental Colloquium, Department of Population, Organismic, and Physiological Biology, University of Colorado, Boulder
- 01/02:** "Paleoclimatology of the Central Andes and Atacama Desert" Departmental Colloquium Speaker, Department of Geosciences, University of Arizona
- 2001    **11/01:** "Vegetation dynamics at decadal to millennial time scales in western North America: Lessons for Ecology and Ecosystem Management," Paleoclimatology of the Atacama Desert and central Andes, Department of Geography, UCLA
- 11/01:** "Paleoclimatology of the Central Andes and Atacama Desert," UCLA
- 10/01:** "Vegetation dynamics at decadal to millennial time scales in western North America: Lessons for Ecology and Ecosystem Management," Department of Biology, Utah State University, Logan.
- 02/01:** "Vegetation dynamics at decadal to millennial time scales in western North America: Lessons for Ecology and Ecosystem Management," College of Natural Resources, University of California-Berkeley
- 01/01:** "Vegetation dynamics at decadal to millennial time scales in western North America: Lessons for ecology and Ecosystem Management," Department of Geology, Department of Biology, University of Utah
- 1999    **09/01/99:** "Climate and vegetation history of the western U.S." Colorado College
- 06/99:** "Reconstructing past environments using fossil rodent middens in the Americas," Universidad de San Agustin de Arequipa, Arequipa, Peru



- 05/99:** "Reconstructing past environments using fossil rodent middens in the Americas," Universidad de San Marcos, Lima, Peru
- 1998 **11/98:** "Mesoscale responses of ecosystem to decadal-scale climate variability," University of Colorado, Boulder  
**03/98:** "The 1950's Drought in the American Southwest," university-wide Global Change Lecture, University of Arizona
- 1997 **02/97:** "Ecophysiological responses to CO<sub>2</sub> enrichment during the last deglaciation," Dept. of Biology, Arizona State University, Tempe, AZ  
**03/97:** "Reconstructing past environments using fossil rodent middens in the Americas, Universidad de Chile, Santiago, Pontificia Universidad Catolica de Chile, Santiago  
**10/97:** "Ecosystem and watershed response to 20th century climate variability in the southwestern U.S.," Columbia University, Biosphere 2, Tucson
- 1996 **12/96:** "Microevolutionary response to environmental changes during the last deglaciation," New Mexico State University, Socorro  
**09/96:** "Microevolutionary response to environmental changes during the last deglaciation," Arizona State University, Phoenix, Sept. 1996.  
**04/96:** "Microevolutionary response to environmental changes during the last deglaciation," Univ. of Nevada-Las Vegas, April 1996.  
**07/96:** "A new method of reconstructing late Quaternary vegetation of the South American deserts," University of Chile, Santiago; Universidad Mayor de San Andres-La Paz, Bolivia, Instituto Miguel Lillo, Tucuman, Argentina, July 1996  
**02/96:** "Microevolutionary response to environmental changes during the last deglaciation", Ohio State University, Columbus, OH  
**02/96:** "Microevolutionary response to environmental changes during the last deglaciation", Kent State University
- 1995 **Fall 1995:** Three lectures in Univ. of Arizona departmental seminars (Office of Arid Land Studies, Laboratory of Tree-Ring Research, and Soil and Water Sciences), Fall 1995
- 1994 **05/94:** "Physiological response of limber pine to CO<sub>2</sub> enrichment during deglaciation," Dept. of Ecology, Evolution & Behavior, University of Minnesota, Minneapolis  
**05/94:** "Ecological consequences of the 1950s drought in the North American subtropics," Dept. of Ecology, Evolution & Behavior, University of Minnesota  
**02/94:** "20th century climate variability in the North American subtropics: Ecological and hydrological consequences," Quaternary Research Center, University of Washington, Seattle  
**02/94:** "Physiological response of limber pine to CO<sub>2</sub> enrichment during deglaciation," College of Forestry, University of Washington
- 1993 **11/93:** "Resetting demographic clocks: Influence of catastrophic drought in southwestern woodlands," Dept. of Biology, Northern Arizona University  
**11/93:** "El Niño, biomass burning and interannual variations in the global carbon budget," Dept. of Biology, Northern Arizona University  
**11/93:** "Changes in plant stomatal density and carbon isotope ratios during the last deglaciation," Dept. of Geology, Northern Arizona University

- 02/93:** "Ecological consequences of the 1950s drought: A natural, cross-scale experiment," Laboratory of Tree-Ring Research, University of Arizona
- 1992 **10/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," Sigma Xi Annual Lecture, Auburn University  
**10/92:** "Packrat historians and the last 40,000 years of biotic change in the American West," Weaver Lecture Series, Auburn University  
**10/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," Geography Departmental Seminar, University of Georgia  
**10/02:** "Packrat historians and the last 40,000 years of biotic change in the American West," Institute of Ecology, University of Georgia  
**06/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," Scripps Institution of Oceanography, La Jolla, CA  
**04/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," Ecology & Evolutionary Biology Departmental Seminar, University of Arizona  
**04/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," INSTAAR, University of Colorado, Boulder  
**04/92:** Discussant, Tanner Lectures on Human Values, Speaker: Jared Diamond, University of Utah  
**04/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," Biology Dept. Seminar, University of Utah, Salt Lake City  
**04/92:** "Packrat historians and the last 40,000 years of biotic change in the American West," Geography and Geology Dept. Seminar, University of Utah, Salt Lake City  
**01/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," Geography Dept. Seminar, Arizona State University
- 1991 **03/91:** "Packrat Middens: The last 40,000 years of biotic change," Ohio State University, Columbus, Ohio
- 1990 **11/90:** "Southwestern U.S. watershed responses to the Southern Oscillation," University of Nevada-Reno  
**11/90:** "Stable isotopes, stomatal density, and DNA in fossil leaves: New application for packrat middens," University of Nevada-Reno  
**10/90:** "Packrat middens, fire scars, and varved ice: New developments in southwestern paleoecology/paleoclimatology," University of New Mexico, Albuquerque  
**01/90:** "The past as the key to the present: Relevance of paleoecology to management of pinyon-juniper and grassland habitats," New Mexico State University, Las Cruces
- 1989 **04/89:** "Fire and flood: El Niño effects in the Southwest," Department of Biology, University of New Mexico, Albuquerque  
**04/89:** "Vegetation history of the Southwest," Department of Biology, University of New Mexico, Albuquerque
- 1988 **11/98:** "Hydroclimatology and geomorphic history of the Santa Cruz River, southern Arizona," Desert Laboratory Seminar Series, University of Arizona, Tucson  
**09/88:** "Long-term climatic variability and ecological change in the North American deserts," University of Colorado, Boulder, September 1988.

- 1987 **10/87:** "Biogeografia de los desiertos norteamericanos, explicaciones historicas," Centro de Investigaciones Biologicas, La Paz, Baja California  
**07/87:** "Plant macrofossil data from the western U.S., methods and applications," New Mexico Mining and Technological Institute, Socorro  
**07/87:** "Climate and vegetation dynamics in the southwestern deserts and uplands," Oregon State University, Corvallis, Oregon, July 1987.  
**02/87:** "Chronology and dynamics of vegetation change in the southwestern U.S. during the late glacial transition," University of Texas, El Paso, Texas, February 1987

#### TECHNICAL PRESENTATIONS AT MEETINGS

(150 presentations, primarily invited, plenary & keynotes)

- 2015 **01/12/15:** Requiem for the Santa Cruz: An environmental History of An Arizona River. Department of Interior, Office of Policy Analysis, Washington, DC  
**04/17/15:** Requiem for the Santa Cruz: An environmental History of An Arizona River. Patagonia Public Library, Patagonia AZ
- 2014 **10/21/14:** Presentation, Patterns, Sources and Impacts of Timing Variations in Seasonal Transitions across CONUS, International Symposium on Weather and Climate Extremes, Food Security and Biodiversity. George Mason University, Fairfax, VA  
**10/11/14:** Presentation, Quaternary Perspectives on the Current Management of Pinyon-Juniper Woodlands. Society of American Foresters Annual Convention, Salt Lake City  
**09/17/14:** Plenary Talk, Patterns, Sources and Impacts of Timing Variations in Seasonal Transitions across CONUS. MTNCLM 2014, Midway, UT  
**02/28/14:** Keynote speaker, 5th Gila Natural History Symposium, Silver City, NM
- 2013
- 2012 **11/06/12:** "Arroyo formation and its aftermath in the Tucson Basin, southern Arizona." Farouk El Baz Award Lecture, Geological Society of America annual meeting, Charlotte.  
**02/29/12:** Banquet Speech, Association for Fire Ecology Regional Conference, Santa Fe
- 2011 **12/06/11:** Presentation, Spring Indices (SI): National (and Global) Indicators of Climate Impacts on Ecosystems and Society, AGU Fall Meeting.  
**10/23/11:** Vegetation History of the Sonoran Desert. BioBlitz 2011. National Geographic Society, Saguaro National Monument.  
**02/16/11:** Plenary Talk: Buffelgrass Invasion and Management in Southern Arizona, Tamarisk Coalition Science Meeting, Tucson  
**04/12/11:** Plenary Speaker, Grass invasions, altered wildfire regimes and climate change, Between a Rock and a Hard Place, Sky Island Alliance, Tucson.  
**04/1, 04/27/11:** Online Presentations for USGS Ecosystem Science Strategy Team on 6 possible initiatives for FY-13, April 1 and 20, 2011. One of my proposed initiatives, Ecosystem Responses to the Early Stages of Climate Change in the U.S., was presented to the Executive Leadership Team for consideration.

- 2010
- 12/07/10:** Buffelgrass Invasion in the Sonoran Desert: What Do We Stand to Lose? Session Presentation, A Conference on Ecosystem Services, Chandler, AZ
- 10/28/10,** "Climate Variability and Change in the American West: Science Issues and Management Challenges" ( plenary, Society of American Foresters, Annual Convention, Albuquerque, NM).
- 08/27/10:** USGS Public Evening Lecture, Menlo Park (see video at <http://online.wr.usgs.gov/calendar/current.html>)
- 04/21-23/10:** Synthesis Keynote Talk and Plenary talk at Conference "Natural Resource Needs Related to Climate Change In the Great Basin and Mojave Deserts: Research, Adaptation, Mitigation" organized by USGS and EPA in Las Vegas. <http://www.wr.usgs.gov/workshops/ccw2010/video/index.html> (select #39). <http://www.wr.usgs.gov/workshops/ccw2010/video/index.html> (select #17)
- 1/27/10:** "Climate Variability and Change in the American West," Plenary presentation, Sixth Annual Gatekeeper Regulatory Roundup (GRR) sponsored by Environmental Professionals of Arizona, Thunderbird Chapter of the Alliance of Hazardous Materials Professionals (AHMP), and the Arizona Emergency Response Commission (AZSERC), Phoenix, AZ [http://www.epaz.org/epazportal/annual\\_conf.html](http://www.epaz.org/epazportal/annual_conf.html)
- 1/12/10:** "Buffelgrass Invasion and Fire Risks in Southern Arizona," Plenary Presentation, Southwest Fire Consortium, USDA DOI Joint Fire Science Program (<http://www.forestguild.org/SWConsortium.html>), Tucson
- 2009
- 12/15/09:** Introductory Talk of Session B08: Toward Phenological Assessments: Regional, National, Global, AGU Fall Meeting
- 12/09/09:** "Climate Variability and Change in the American West," Retreat for Environmental Reporters on Climate and Energy issues, Institute of Journalism and Natural Resources (<http://www.ijnr.org/index.html>), Albuquerque (see news story at <http://climateprogress.org/2009/11/27/toronto-star-why-media-tell-climate-story-poorly/>)
- 11/03/09:** "Climate Variability and Change in the American West," Plenary Presentation, Water Resources Technical Committee, Arizona Society of Civil Engineers, Phoenix
- 10/28/09:** Plenary Presentation, Restoring the West Conference: Peaks to Valleys, Innovative Land Management for the Great Basin, Utah State University (<http://extension.usu.edu/forestry/utahforests/rtw2009/rtw2009.html>); I also did a half hour interview with Access Utah, Utah Public Radio, one week after climate change hearings in the Utah State legislature and the morning of my plenary talk at the 2009 Restoring the West Conference
- 10/26/09:** Plenary Presentation, "Climate and Plant Invasions in the American West" Strategic Management of Invasive Species in the Southwest Workshop. Department of Defense and Center for Invasive Species Management, BLM Training Center, Phoenix (video available at <http://www.weedcenter.org/dodworkshop/2009/>)
- 10/06/09:** Introductory Talk, "Toward a National Phenological Assessment," USA-National Phenology Network, Research Coordination Network 3rd Annual Meeting (<http://www.usanpn.org/rcn-2009>)

**09/23/09:** "Coping with Nonstationarity in Water and Ecosystem Management," SAHRA (Sustainability of Semi-Arid Hydrology and Riparian Areas) 9<sup>th</sup> Annual Meeting: Climate, Water and Land Cover Change in a Nonstationary World, Tucson,

**8/13/09:** "How do plants actually migrate? Lessons from the Holocene in the American West", USGS National Headquarters, Geography Discipline Seminar

**8/05/09:** "Climatic Precursors for Early Spring Onset and Large Wildfires in the Western U.S.", Ecological Society of America Annual Meeting, (Symposium on Phenology, the Interdisciplinary Canary: Linkages between Ecology and Sustainable Decision Making in a Dynamic Environment), Albuquerque, NM

**8/02/09:** "Decisions, Decisions: Grass Invasions and Altered Wildfire Regimes in the American Deserts with or without Climate Change" Ecological Society of America Annual Meeting, (Workshop on Restoring and Sustaining Western Landscapes: Interaction with Climate Change), Albuquerque, NM

**7/09/09:** "Phenology, Climate Change, and the Need to Engage the Public in Generating and Using Phenology Products." National Park Service Webinar on Climate Change

**6/24/09:** "Climate Change in the American West: Issues and Opportunities for the American Seed Industry." Featured Speaker, Environmental and Conservation Seed Committee, American Seed Trade Annual Association, 126<sup>th</sup> Annual Convention, Scottsdale, AZ

**5/27/09:** "Decisions, Decisions: Grass Invasions and Altered Wildfire Regimes in the American Deserts," Joint Assembly Meeting, AGU Biogeosciences AGU Fellows Session, Toronto

**5/07/09:** "Decisions, Decisions: Grass Invasions and Altered Wildfire Regimes in the American Deserts," Annual meeting of Invasives Species Advisory Committee to the National Invasives Species Council, chaired by Sec. Salazar, Tucson, AZ

**4/22/09:** "Decisions, Decisions: Grass Invasions and Altered Wildfire Regimes in the American Deserts," University of Arizona Environmental Summit

**4/02/09:** "Climate Variability, Climate Change, and Ecological Restoration in the American West" DOI National Restoration Program Annual Meeting, Phoenix (PLENARY)

**3/25/09:** "Climate and Ecosystems in the western U.S.: Reflections and Prospectus," Featured 1-hr presentation, Climate Specialty Group, Am. Assoc. of Geographers Annual Meeting, Las Vegas ( featured evening talk).

**2/25/09:** "Climate Variability and Climate Change in the West," Dynamic Deserts Conference, Arizona State University, Phoenix

**2/11/09:** "Community Response to Buffelgrass Invasion in the Sonoran Desert" Udall Foundation, Tucson

**1/21/, 1/31, 03/09/09:** "Fire Risks Associated with Buffelgrass Invasion in Southern Arizona: Call to Action." Three presentations to City of Tucson Fire Departments, Association of Pima County Fire Department Chiefs, and Southern Arizona Fire Marshalls.

**1/29/09:** "Climate Variability and Change in the West," Arizona Riparian Council, Tucson (dinner speaker)

**1/21/09:** "Adaptive Management of Climate Change Impacts on Ecosystems: Some Personal Perspectives," Climate Change and Adaptation Conference (UA College of Law), Tucson, AZ

- 2008
- 12/09/08:** "Invasive Species and Altered Wildfire Regimes in the American Deserts," Society for Range Management and BLM Conference on Wildfires and Invasive Plants in the American Deserts (keynote speaker).
- 10/29/08:** "Climate Change and Phenology in the West," Climate Change and Earlier Springs in the West" USGS Geography meeting, Tucson (keynote speaker)
- 10/22/08:** "Climate Change and Climate Variability in the American West," Annual Conference, National Association of Fish and Wildlife Service Hydrologist (Keynote speaker along with former Secretary of Interior Stewart Udall).
- 10/10/08:** "Climate Change and Phenology in the West," Characterizing the Phenology of Southwest Landscapes, Second Annual NPN- American Society of Photogrammetry & Remote Sensing Symposium
- 10/02/08:** "Buffelgrass Invasion in the Sonoran Desert and the Effort to Stop it," Tucson Rotary Club
- 09/10/08:** "Effects of climatic variability and change on Colorado River water supply" City of Tucson/Pima County Water Advisory Committee meeting.
- 07/30/08:** "Climate Change and Climate Variability in the American West" Annual Conference of the Soil and Water Conservation Society, Tucson, City of Tucson/Pima County Water Study Advisory Committee
- 07/10/08:** "The Buffelgrass Threat in Southern Arizona and the Role of Government," Buffelgrass Mobilization Forum, University of Arizona, Tucson
- 04/22/08:** "Paleoecological perspectives, historic range of variability, and ecosystem management", The Nature Conservancy/Forest Service Historical Ecology Workshop, Lansdowne, VA,
- 04/05/08:** "The Buffelgrass Threat in Southern Arizona and the Role of the Business Community", Southern Arizona Leadership Council, Tucson
- 01/29/08:** "Buffelgrass Invasion and Fire Risk in the Sonoran Desert" Annual Conference, Association of Fire Ecology's Annual Conference, Tucson
- 2007
- 12/07:** "From Fireproof Desert to Flammable Grassland: Buffelgrass Invasion in the Sonoran Desert," American Geophysical Union Annual Meeting, San Francisco,
- 12/07:** "Climate Variability and Change in the West", Texas Water Summit 2007, San Antonio
- 10/07:** "Organization of a National Phenology Network in the U.S. and some lessons learned for network development in the Southern Cone of South America," Argentina-Chile Binational Ecological Society meeting, La Serena, Chile
- 10/07:** "The influence of paleoclimatic evidence on climate change policy", City of La Serena, Chile ( Public Talk)
- 10/07:** "Climate variability and change in the SW U.S." Department of Defense, Threatened, Endangered and at Risk Species in the Southwest Workshop, Tucson (Plenary).
- 2006
- 06/06:** "Development of a USA-National Phenology Network," U.S. Geological Survey-Executive Leadership Team, Reston, VA
- 06/06:** "Development of a USA-National Phenology Network," USGS Global Change Sciences Conference
- 09/06:** "Development of a USA-National Phenology Network," Consortium for Integrated Climate Research in Western U.S. Mountains (CIRMOUNT)-MTNCLIM Conference, Luncheon talk



- 10/06:** "Development of a USA-National Phenology Network" 2nd NPN Planning Workshop, Milwaukee, WI
- 10/06:** "Late Quaternary history of desert grasslands: The most stable biome in western North America and its unstable future," 3rd Annual Research Insights in Semi-arid Environments, Tucson
- 2005 **11/05:** "Patterns, sources, and impacts of decadal-to-multidecadal climate variability in the U.S., Bureau of Reclamation River Systems Management Conference, Las Vegas
- 2005:** "Buffelgrass Invasion in the Sonoran Desert: A Call to Action" in 2005-2006, I gave this presentation across many venues in southern Arizona, including local governments (e.g., hearings of the Pima County Board of Supervisors and the Town of Marana Council) and the corporate sector (e.g., Board of Directors Meeting for Southern Arizona Lodging and Resort Association).
- 2004 **04/04:** "Historic Drought Variability in the West," DOI, Western Drought Communication Workshop, Denver
- 08/04:** NSF, AIBS & NEON, Ecological Impacts of Climate Change (organized workshop & was lead author in workshop report)
- 2003 **09/19/03:** "PDO, AMO, and megadrought in the Western U.S.," Annual Symposium of the Arizona Hydrological Society, Mesa, Arizona, Sept. 19, 2003.
- 09/09/03:** "The current drought in historical perspective," New Mexico Drought Summit, organized by the State Engineer's Office and Southwest Strategy, (PLENARY).
- 09/09/03:** "The current drought in historical perspective," Citizen's Water Advisory Council, Tucson Water
- 05/15/03:** "Prospects for ongoing drought in Arizona and the Southwest," Briefing to the Governor's Task Force on Drought, Arizona Department of Water Resources, Phoenix, AZ
- 05/12/03:** "The current drought in historical perspective," Southwest Drought Summit, Northern Arizona University, Flagstaff, ( PLENARY).
- 04/25/03:** "The current drought in historical context" Workshop on Land Management in a Changing Climate, Sustainable Technologies, Agribusiness and Resources (STAR) Research Center and Department of Applied Biological Sciences, Arizona State University East Campus, Mesa, AZ, ( PLENARY).
- 04/14/03:** "Ecosystem responses to climate variability," USGS Workshop on Development of Integrated Models to Forecast Landscape Change, Tucson, AZ, April 14, 2003.
- 04/08/03:** "Vegetation and Climate History of the Atacama Desert and Pacific slope of the Central Andes," 20th Annual Pacific Climate Workshop, Pacific Grove, CA.
- 01/03:** "New frontiers for interdisciplinary, field research programs: An example from the Atacama Desert" Inaugural meeting of the International Biogeography Society, Mesquite, Nevada( PLENARY)
- 2002 **11/02:** "Historical context for ongoing drought in the Southwest, Rockies and Great Plains" Colloquium, Arizona Department of Water Resources, Tucson

- 09/02:** "Multidecadal oscillations in the drought-sensitive tree-ring record of the central and southern Rockies" Drought in Mesic and Arid Environments: Climatology, Biotic Responses, and Feedback. Workshop Funded by the National Science Foundation (IGERT and Biocomplexity Programs) and the University of New Mexico Center for Advanced Studies, Sevilleta LTER Research Station, New Mexico .
- 08/02:** "A History of the Desert Laboratory: 1903-2002" Ecological Society of America Annual Meeting, Tucson, Aug. 2002 (ESA Meeting Field Trip organized by Jan Bowers and myself)
- 2001
- 12/01:** "Paleoclimatology of the Central Andes and Atacama Desert" Western Region Colloquium, USGS, Menlo Park, Dec. 2001
- 09/01:** "Late Quaternary climate change in the central and southern Andes from an Atacama perspective," XIII Reunion Nacional de Botanica, Universidad de La Serena, La Serena, Chile ( KEYNOTE)
- 09/01:** "Role of environmental heterogeneity and climate variability in plant invasions: insights from the fossil record," California Plant Pest Council Annual Meeting, San Diego, ( KEYNOTE)
- 06/01:** "Late Quaternary biogeography and climate of the Pacific slope of the central Andes. "Workshop on Climate Change at High Elevation Sites: Emerging Impacts, Davos, Switzerland
- 04/01:** "Historic climate variability and vegetation dynamics in the southwestern U.S.: Empirical needs for predicting future vegetation change." USGS Workshop on Present and Future Climate in the Southwestern U.S., Tucson
- 01/01:** "Long-term history and dynamics of North American pinyon-juniper woodlands," Workshop on the Biocomplexity of Pinyon-Juniper Woodlands, Flagstaff, AZ.
- 01/01:** "Vegetation and winter rainfall history of the southern Atacama Desert" Central Andes Paleoclimate Workshop, Tucson
- 2000
- 12/00:** "Evidence and management implications of ecosystems presently undergoing natural migration," American Geophysical Union, San Francisco
- 02/00:** "Late Quaternary history of North American junipers." Society of Range Management Annual Meeting, Boise
- 02/00:** "Paleoflood hydrology in the western U.S." USGS, WRD, Western Region District Chiefs Meeting, La Jolla
- 02/00:** "Climate variability and surface water: Southwest" Western Region District Chiefs Meeting, La Jolla
- 10/99:** "Regional Synchrony of Vegetation Disturbance and Demography in the Southwestern U.S.," Southwestern Association of Biologists, Ghost Ranch, NM (KEYNOTE)
- 08/99:** "Fossil rodent middens and vegetation history of the central Atacama Desert, northern Chile," Ecological Society of America 84th Annual Meeting, Spokane
- 10/13-16/99:** "Climatic variability in the American Southwest: Is it a factor in conservation?" 26<sup>th</sup> Annual Natural Areas Association Conference, Tucson
- 11/99:** "Fire effects on western watersheds," National Research Council panel on USGS activities, Menlo Park, CA

- 2008      **04/28/98:** "Historical Ecology and Ecosystem Management: Using the Past to Manage the Future," Association of Forest Service Employees for Environmental Ethics, Oracle, AZ  
**03/19/98:** "The Middle Holocene in the Americas"; PEP-1 Pole-Equator-Pole Paleoclimate in the Americas; Session Coordinator and Presenter; Merida, Venezuela  
**01/7-9/98:** "The 1950s Workshop: Drought in the American Southwest"; Workshop Coordinator and Presenter; Sevilleta LTER Research Station, New Mexico
- 1997      **11/24/97:** "A Natural History of the American Southwest"; Julio Betancourt, Western Region Colloquium, USGS, Menlo Park, CA  
**10/10/97:** "USGS Fire-Watershed Activities"; U.S. Forest Service Future of Fire Research Workshop, October 10, 1997; Park City, Utah  
**09/15/97:** "Synchronized, regional establishment and mortality across southwestern woodlands"; USDA Forest Service, Workshop on Pinyon-Juniper Woodlands, Julio Betancourt, Brigham Young University, Provo, Utah  
**09/03/97:** "Effects of Climate Variability on Southwestern Ecosystems," Regional Workshop on Climate Impacts (CLIMAS) in the Southwestern U.S., Tucson  
**08/26/97:** "USGS Fire-Watershed Activities" Interagency Fire Center, Boise, ID  
**10/03/97:** "New Perspectives on the Environmental History of the Desert Southwest"; Society of Environmental Journalists, Tucson,  
**09/22/97:** "Vegetation history of the Sevilleta LTER", NSF Site Review, Sevilleta LTER,, Albuquerque, NM  
**06/17/97:** "USGS Fire-Watershed Activities" Arizona WRD District; Tucson, AZ  
**06/97:** "Climate variability and ecosystem change in the North American Deserts" USDA, Forest Service, Verde Valley/Prescott Microfloral Ecosystem Workshop, Sedona, AZ, (KEYNOTE)  
**06/97:** "Lessons from vegetation history in the southwestern U.S." Lake Tahoe, UN-Reno and DRI, Changing Water Regimes in Drylands Conference, Desert Research Institute and University of Nevada, Reno  
**01/97:** "Climate variability and ecosystem change in the North American Deserts," Western Naturalists Association, La Paz, Baja California.
- 1996      **03/96:** "A Natural History of the American West," KEYNOTE Public Lecture for Public Conference on "Field Scientists and the Shaping of the American West," Center of the American West, University of Colorado, Boulder  
**12/96:** "Climate variability and catastrophic drought in the southwestern U.S.," New Mexico Chapters of the Society for Soil and Water Conservation and Society for Range Management, Socorro, NM, Keynote Speaker  
**04/12-13/96:** "Climate variability as a constraint on management and restoration of riparian areas," Arizona Riparian Council 10th Annual Meeting, Prescott, Arizona, (KEYNOTE)
- 1995      **05/95:** "Long and short-term climatic influences on southwestern shrublands," 9th Wildland Shrub Symposium (Theme: Shrub Ecosystem Dynamics in a Changing Environment), USDA-Forest Service, Las Cruces, KEYNOTE  
**09/14-16/95:** "Extreme climate variability: Planning for natural catastrophe", Tucson, Arizona Hydrologic Society's 8th Annual Symposium, KEYNOTE

- 1994      **02/94:** "Plant physiological responses to CO<sub>2</sub> variations during last glacial-interglacial cycle," Carbon Cycle Workshop, USGS, Boulder
- 1993      **10/93:** "Climate variability in the North American subtropics," NSF and PAGES (Past Global Changes), A Core Project of the International Geosphere-Biosphere Programme (IGBP). Pole-Equator-Pole Research (PEP) Initiative, "Late Quaternary Paleoclimates in the Americas: Dynamics of Past Climate Change and its Forcing Along a Transect from Pole to Pole," Smithsonian Tropical Research Institute, Panama City, Panama  
**08/93:** "Ecological Consequences of the 1950s drought in the American Southwest," Ecological Society of America, Madison, WI.  
**07/93:** "Influence of climate variability on southwestern vegetation," Hot Deserts Symposium, Society of Range Management, Phoenix  
**04/93:** "Influence of climate and history on New Mexico pinyon-juniper woodlands," Symposium on Managing Pinyon-Juniper Woodlands for Sustainability and Social Needs, U.S. Forest Service & New Mexico Land Department, Santa Fe  
**01/93:** "Ecological consequences of the 1950s drought in the American Southwest," Global Change Lecture Series, U.S. Geological Survey, Reston, VA
- 1992      **10/92:** "Resetting demographic clocks: Tree mortality during the 1950s drought in the southwestern U.S." Workshop: Managing Arid and Semiarid Lands in the Face of Global Change, National Center for Atmospheric Research and U.S. Forest Service, Boulder  
**07/92:** "Historical imprints on Rocky Mountain forests and woodlands," Annual Meeting of the Western Forest Genetics Association, Boulder (KEYNOTE).  
**07/92:** "Packrat historians and the last 40,000 years of biotic change in the American West, and "Laminated ice deposits as climatic proxies from (invited talks), Idaho National Engineering Laboratories, Idaho Falls  
**4/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," INSTAAR, Boulder  
**04/92:** Niño, biomass burning and interannual variations in the global carbon budget," Western Region, Menlo Park  
**04/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," Agricultural Research Service, USDA, Tucson  
**01/92:** "El Niño, biomass burning and interannual variations in the global carbon budget," Global Change Lecture Series, National Headquarters, Reston
- 1991      **08/91:** "Climatologies and carbon gas emissions associated with large historic wildfires," 10<sup>th</sup> International Symposium on Environmental Biogeochemistry, San Francisco  
**02/91:** "The role of climate and land use in channel changes and flood frequency of the Santa Cruz River, southern Arizona", USGS-WRD Research Committee Meeting, Rio Rico, AZ.  
**02/91:** "The role of climate and land use in channel changes and flood frequency of the Santa Cruz River, southern Arizona", USGS-WRD Research Committee Meeting, Rio Rico, AZ

- 1990      **12/90:** "New developments in southwestern paleoecology and paleoclimatology", USGS National Headquarters, Reston  
**07/23-25/90:** "Historical phenomena and their imprint on southwestern biodiversity," Southwestern Biodiversity Symposium, Las Cruces  
**05/90:** "El Niño, La Niña and Fires in the American Southwest," USGS Joint Disciplinary Meetings, Ecology and Water Chemistry, Estes Park, CO  
**04/90:** "El Niño, La Niña and Fires in the American Southwest," U.S.G.S., Joint Disciplinary Meetings, Ecology and Water Chemistry, Estes Park  
**03/90:** "Long-term history of the woodland-desert grassland ecotone in the southwestern U.S." Scientific Committee on Problems of the Environment (SCOPE) Workshop, Kellogg Long-Term Ecological Research Station, MI
- 1989      **12/89:** "Fire-Southern Oscillation relations in the southwestern United States," USGS National Headquarters, Reston  
**03/5-8/89:** "Climatic variability and flood frequency in southern Arizona," Sixth Annual Pacific Climate (PACCLIM) Workshop, Asilomar, CA
- 1988      **09/88:** "El Niño, La Niña, and Southwestern weather," USGS Arizona Water District, Seminar Series, Tucson  
**07/88:** "Vegetation history in the monsoonal Southwest," Workshop: Climatic Change in Arid Lands, NASA and University of Washington, Seattle  
**09/88:** "El Niño, La Niña, and Southwestern weather," Arizona District, USGS Seminar Series, Tucson  
**02/15-17/88:** "An overview of Southwestern American climate and ENSO processes," Paleoecology Workshop sponsored by NSF and NOAA, Boston, MA
- 1987      **04/87:** "Packrat midden research in the western U.S.," and "Climate, land use, and channel history for the Santa Cruz River, Tucson," Global Change Lecture Series, National Headquarters, Reston.  
**08/87:** "Vegetation of the southwestern U.S.: The late glacial transition," XII International Quaternary Congress, Ottawa, Canada  
**08/87:** "Southern Arizona flooding during El Niño years: Floodplain management implications," and "Late Quaternary vegetation history of the southwestern U.S.: The packrat midden record," 4<sup>th</sup> Annual Pacific Climate (PACCLIM) Workshop, Asilomar, CA  
**04/87:** "Packrat midden research in the western U.S.," and "Climate, land use, and channel history for the Santa Cruz River, Tucson," Global Change Lecture Series, National Headquarters, Reston
- 1986      **11/86:** "Sampling patterns in the packrat midden record", 99<sup>th</sup> Annual Meeting of the Geological Society of America, San Antonio, Texas  
**01/86:** "Paleoecology of pinyon-juniper woodlands in the western U.S.: Summary," (Session chairman and speaker), 2nd Pinyon-Juniper Conference, USDA Forest Service and University of Nevada, Reno  
**10/85:** "Historic arroyo-cutting and subsequent channel changes at the Congress Street crossing, Santa Cruz River, Tucson, AZ," International Arid Lands Research and Development Conference, Tucson, AZ  
**04/85:** "Geomorphic implications of late Quaternary vegetation changes in the

Colorado River Basin" Geological Society of America Penrose Conference, Lake  
HavasuAZ: **08/84**: "Role of summer rainfall in the late Quaternary distribution of  
Pinus edulis in the southwestern U.S.," American Quaternary Association 6<sup>th</sup>  
Biennial Meeting, Boulder, CO1981**05/81**: "Holocene vegetation history of Chaco  
Canyon, New Mexico," Society for American Archeology, San Diego, CA